

Remarks

1. Status of the Application

Claim 1-3, 5-11, 13, 14, 17-26, 55-58 and 65-93 are currently pending. Claims 1-3, 5-10, 14, 18-26, 55-58, 66-69, 75-80 and 82-93 were rejected. Claims 11, 13, 17, 65, 70-74 and 81 were objected to as being dependent upon a rejected base claim, but the Office action indicated they would be allowable if rewritten in independent form including all the limitations of the base claim and any intervening claims. Claims 27-54, 59-64, 78 and 85 have been canceled, and new claims 94-114 are added. Thus, after entry of this amendment claims 1-3, 5-11, 13, 14, 17-26, 55-58, 65-77, 79-84 and 86-114 are pending.

2. Support for Amendments to the Claims

The amendments to claim 1 are supported, for example, at page 9, lines 19-22 and 25-29, where the application states:

For example, the biological activity of a test compound may be predicted by comparing the signals in bins of the training set spectral data that are found to be associated with a biological activity (such as strong estrogen receptor binding) to signals in corresponding bins of the spectral data of the test compound. . . . Some of the bins of the training set spectral data may contain signals more consistently associated with strong estrogen receptor binding, in which case the presence of signals in the corresponding bins for the test compound would be more heavily weighted in assigning a predicted biological activity to the test compound.

Further support for the amendment to claim 1 may be found at page 10, lines 14-18, ("the spectral data of the training set of compounds is weighted prior to pattern recognition to emphasize those sub-spectral units (bins) that are most important . . ."). Additional support is found from page 26, line 20 to page 27, line 7, discussing the particular example of Fisher-weighting. The other amendment to the claim merely provides clearer antecedent basis for language later in the claim.

Claim 10 has been amended solely for clarity.

Claim 11 has been rewritten in independent form including all of the limitations of base claim 1. There were no intervening claims.

Claim 13 has been rewritten in independent form including all of the limitations of base claim 1. There were no intervening claims.

Claim 17 has been rewritten in independent form including all of the limitations of base claim 1. There were no intervening claims.

Support for the amendments to claim 18 is provided throughout the application, and specifically at page 9, lines 15-16 and at page 10, lines 10-19.

Claim 21 has been amended solely for clarity.

Support for amendments to claims 25, 26 and 90 may be found in Example 10 (pages 67-71) which discusses computer environments for performing the disclosed methods. At page 69, lines 7-8, the application states that “computer readable media provide nonvolatile storage of data, data structures, computer-executable instructions etc.”

Claim 69 was amended solely for clarity.

Claims 70-74 have been rewritten in independent form including all of the limitations of base claim 69 and any intervening claims.

Claim 75 was amended solely for clarity.

Claim 79 was amended solely for clarity and to provide proper dependency since the claim it previously depended from has been canceled.

Claim 81 has been rewritten in independent form including all of the limitations of base claim 69 and intervening claims 75 and 76.

Claim 82 has been amended solely for clarity.

Support for the amendments to claim 91 may be found at page 3, lines 24-25 where the application states that “the reliability of a QSAR may be tested using a validation set of data,” and at page 21, lines 1-2, where the SDAR methods of the application are disclosed to be QSAR methods. Additional support may be found at page 17, lines 9-11.

Claim 92 has been amended to clarify the fact that leave-one-out cross validation does not depend upon the existence of a validation set of data and therefore may be performed independently from testing with a validation set. Support for the amendment appears on page 20, lines 23-29, where the application states that leave-one-out (LOO) cross-validation is:

a method whereby each compound in the training set is systematically excluded from the data set, after which its endpoint value is predicted by the spectral data-activity relationship derived from the remaining compounds (See, Cramer et al., *Quant. Struct-Act. Relat.* 7: 18-25, 1998, incorporated herein by reference). Cross-validation is useful for judging the reliability of a spectral data-activity relationship, especially where a validation set of compounds is not available.

Support for new claim 94 may be found, for example, at page 62, lines 28-29.

Support for new claim 95 may be found, for example, at page 21, lines 10-14.

Support for new claim 96 may be found, for example, at page 62, lines 28-29.

Support for new claim 97 may be found, for example, at page 65, lines 23-24.

Support for new claim 98 may be found, for example, at page 65, lines 23-24.

Support for new claim 99 may be found, for example, at page 62, lines 28-29.

Support for new claim 100 may be found, for example, at page 21, lines 10-14.

Support for new claim 101 may be found, for example, at page 62, lines 28-29.

Support for new claim 102 may be found, for example, at page 34, lines 24-25.

Support for new claim 103 may be found throughout the application. However, specific support may be found, for example, at page 9 where the invention is said to include “obtaining spectral data . . . for a test compound, and comparing the spectral data for a test compound to a pattern derived . . . from . . . spectral data . . . of a training set of compounds having known biological activity” (page 9, lines 1-6). That same paragraph also notes that “[t]raining set patterns and similarities between the training set patterns and the test compound’s spectral data are conveniently detected, in some embodiments, by segmenting the spectral data of the training set and test compounds into spectral units (bins)(page 9, lines 13-18). Further embodiments of this method are described at page 10, lines 10-19, as including segmentation, weighting and scaling. The use of spectral data-activity relationships in association with this method is described at page 9, lines 7-9 and 19-22. Additional support is found, for example, at page 17, lines 1-3 and 25-27, in FIG. 4, and in Example 1 on pages 31-40.

Support for new claim 104 may be found, for example, at page 10, lines 3-9.

Support for new claim 105 may be found, for example, at page 21, line s 13-14.

Support for new claim 106 may be found, for example, at page 10, lines 3-9.

Support for new claim 107 may be found, for example, at page 62, lines 28-29.

Support for new claim 108 may be found, for example, at page 10, line 4.

Support for new claim 109 may be found, for example, at page 34, lines 24-25.

Support for new claim 110 may be found, for example, at page 10, lines 10-19.

Support for new claim 111 may be found, for example, at page 10, lines 10-19.

Support for new claim 112 may be found, for example, at page 11, lines 19-24.

Support for new claim 113 may be found throughout the application. However, specific support may be found, for example, at page 9, lines 3-4 (obtaining spectral data for a test compound) and lines 15-16 (segmenting the data in some embodiments), as well as page 10, lines 10-19 (in some embodiments the data is weighted, auto-scaled, and Fisher weighted). See also page 17, lines 25-27, where a spectral data-activity relationship is defined as “a correlation between endpoint data and spectral data for a group of compounds, useful for among other things for predicting the endpoint data for compounds from their spectral data.” An endpoint is defined at page 17, lines 1-3 as “a particular biological, chemical or physical property.” Establishment of an SDAR using segmented, autoscaled and Fisher-weighted spectral data is shown, for example, in the particular embodiment of FIG. 4. Additional support is provided in Example 1 (pages 31-40) which demonstrates establishment of an SDAR for a biological activity (estrogen receptor binding activity) and its use to predict biological activities of compounds (as part of a LOO cross-validation).

Support for new claim 114 may be found, for example, at page 10, line 4.

3. Rejections under 35 U.S.C. §101

Claims 25, 26 and 90 were rejected for allegedly not being directed to statutory subject matter. Applicants request reconsideration of these rejections for the following reasons.

Claims 25, 26 and 90 have been amended to recite the feature of “computer-executable instructions” stored on a computer readable medium as suggested by the examiner. Claims 25, 26 and 90 are directed to statutory subject matter, and the rejections of these claims under 35 U.S.C. §101, should be withdrawn. Applicants respectfully request withdrawal of the rejections and allowance of claims 25, 26 and 90.

4. Rejections under 35 U.S.C. §112, first paragraph

Claim 91 was rejected for allegedly failing to comply with the written description requirement. Although applicants disagree that the feature of “validating” is not supported by the discussion in the application of testing QSARs using a validation set, the claim has nonetheless been amended as suggested by the examiner. Claim 91 has been amended to recite the feature of “testing the spectral data activity relationship with a validation set of data.” As

written, claim 91 is supported by the application, and the rejection under 35 U.S.C. §112, first paragraph, should be withdrawn.

5. *Rejections under 35 U.S.C. §112, second paragraph*

Claims 10, 18-24, 56-58, 68 and 82-93 were rejected for allegedly being indefinite under § 112, second paragraph. Applicants traverse these rejections for the following reasons.

Claim 10 was rejected as allegedly indefinite for reciting “to produce the spectral pattern for the test compound.” This feature has been removed from claim 10, which has been amended to recite “wherein segmenting the spectral data of the test compound comprises segmenting into substantially the same spectral sub-units as the segmented spectral data of the training set of compounds.” Claim 10, as amended, is definite, and the rejection of claim 10 under 35 U.S.C. §112, second paragraph, should be withdrawn.

Claim 18 was rejected for allegedly being indefinite for requiring spectral data for a test compound, but not clearly setting forth a step where it is used. Claim 18 has been amended to recite the feature of “segmenting the spectral data of the test compound into segmented spectral data for the test compound,” and the feature of “predicting the biological activity of the test compound from the segmented spectral data for the test compound using the spectral data-activity relationship.” Claim 18, as amended, clearly sets forth a step where the spectral data for a test compound is used. The rejection of claim 18 under 35 U.S.C. §112, second paragraph, has therefore been overcome.

The §112 rejections of claims 19-24 have been overcome for the same reasons discussed in the preceding paragraph for claim 18, from which claims 18-24 depend.

Claim 21 was rejected as allegedly being indefinite for reciting the phrase “two or more such spectral data.” Claim 21 has been amended to remove this phrase and to use language similar to claim 84, as suggested by the examiner.

Claims 22-24, depend from claim 21, and therefore the rejection under §112 has been overcome for the same reasons discussed in connection with claim 21 in the preceding paragraph.

Claim 78 has been canceled.

Claim 82 was rejected for allegedly being indefinite for requiring spectral data for a test compound, but not clearly setting forth a step where it is used. Claim 82 has been amended

similarly to claim 18, in the manner suggested by the examiner, and the §112 rejection has been overcome.

Claims 83-84 and 86-93, depend from claim 82, and their rejection under §112 has been overcome for the same reasons discussed in connection with claim 82 in the preceding paragraph.

Claim 85 has been canceled.

These amendments are believed to overcome the §112 rejections. Applicants thank the examiner for her helpful suggestions with respect to overcoming these rejections.

6. Rejections under 35 U.S.C. §102

Claims 1-3, 5-10, 14, 18-21, 25-26, 55-58, 66-69, 75-80 and 90 were rejected for allegedly being anticipated by Bursi et al. Applicants traverse these rejections for the following reasons.

Claim 1 is not anticipated by Bursi et al. To anticipate a claim, a reference must teach each and every feature of the claim (MPEP 2131). Bursi et al. does not teach the feature of “scaling” that appears in claim 1. Although the Office action alleges that “data conversion” as taught by Bursi et al. may be equated with scaling, that contention is contradicted by the Bursi et al. reference itself. Bursi et al. specifically teaches (at page 862) that “[d]ata conversion ... is essentially a change of the sampling interval.” In other words, data conversion as taught by Bursi et al. is related to the way spectral data is segmented. Segmentation relates to the division of spectral data into sub-spectral units (such as the sampling interval), whereas scaling relates to manipulating the intensity of signals that fall within particular sub-spectral units. Thus, Bursi et al. does not anticipate claim 1 for at least the reason that it does not teach scaling. The rejection of claim 1 under 35 U.S.C. §102 should be withdrawn and claim 1 should be allowed.

Applicants respectfully request such action.

Bursi et al. also fails to anticipate amended claim 1 in which weighting the spectral data is said to emphasize bins associated with the biological activity of the test compounds. The Office action had noted that Bursi et al. anticipated claim 1 because the language of the claim had been interpreted to cover equally weighted bins, as in Bursi et al. Amended claim 1 overcomes that rejection. Since the cited reference neither discloses nor suggests the claimed weighting, claim 1 is allowable.

Claim 1 also is not obvious in view of Bursi et al. because Bursi et al. does not teach or suggest scaling, and provides no motivation for using scaling in combination with spectral data or the other features of claim 1.

Claims 2, 3 and 6-10 are not anticipated by or obvious in view of Bursi et al. for at least the same reasons as claim 1, from which they depend, is not anticipated by or obvious in view of Bursi et al. Furthermore, Bursi et al. does not teach, suggest or provide a motivation to use any of the features of claims 2, 3 and 6-10 in combination with scaling and the features of claim 1. The rejections of dependent claims 2, 3, and 6-10 should therefore be withdrawn.

Claim 11, which was objected to, has been rewritten in independent form including all the limitations of the base claim and any intervening claims, and is therefore allowable. Applicants thank the examiner for indicating the allowability of this claim.

Claim 13, which was objected to, has been rewritten in independent form including all the limitations of the base claim and any intervening claims, and is therefore allowable. Applicants request allowance of claim 13 as amended. Applicants thank the examiner for indicating the allowability of this claim.

Claim 14 is not anticipated by or obvious in view of Bursi et al. for at least the same reasons as claim 1, from which it depends. Furthermore, Bursi et al. does not teach, suggest or provide a motivation for using the feature of statistical pattern recognition in combination with scaling.

Claim 17, which was objected to, has been rewritten in independent form including all the limitations of the base claim and any intervening claims, and is therefore allowable. Applicants request allowance of claim 17 as amended. The examiner had indicated the allowability of this claim if it were rewritten in this fashion.

Claim 18 has been amended to recite the features of auto-scaling and Fisher-weighting. Bursi et al. does not teach Fisher-weighting or any type of scaling, let alone auto-scaling. Thus, claim 18 is not anticipated by Bursi et al because Bursi et al. does not teach all of the features of claim 18. Furthermore, claim 18 is not obvious in view of Bursi et al. because Bursi et al. does not provide a suggestion or motivation to use scaling and/or Fisher-weighting of spectral data, either alone, or in any combination with the other features of claim 18. The rejection of claim 18 under 35 U.S.C. §102 should be withdrawn, and claim 18 should be allowed.

Claim 19 is not anticipated by or obvious in view of Bursi et al. for at least the same reasons as claim 18, from which it depends. Furthermore, Bursi et al. does not teach, suggest or provide a motivation for the feature of statistical pattern recognition in combination with Fisher-weighting and/or scaling.

Claims 20 and 21 are not anticipated by or obvious in view of Bursi et al. for at least the same reasons as set forth in connection with claim 18, from which they directly or indirectly depend.

Claim 22 is not anticipated by or obvious in view of Bursi et al. for at least the same reasons as claim 18. In addition, Bursi et al. does not teach the feature of a spectral data-activity relationship comprising canonical variate factors as recited in claim 22. Bursi et al. also does not provide a suggestion or motivation for using canonical variate factors, either alone or in any combination with the features of claims 18 and 21 from which it depends.

Claims 23 and 24 are not anticipated by or obvious in view of Bursi et al. for at least the same reasons as claims 18, 21 and 22, from which they directly or indirectly depend.

Claim 25 is not anticipated by or obvious in view of Bursi et al. for at least the same reasons as claim 1, from which it depends.

Claim 26 is not anticipated by or obvious in view of Bursi et al. for at least the same reasons as claim 18, from which it depends.

Claim 55 is not anticipated by or obvious in view of Bursi et al. for at least the same reasons as claim 1, from which it depends.

Claims 56-58 depend from claim 18, and are not anticipated by or obvious in view of Bursi et al. for at least the same reasons as discussed in connection with claim 18.

Claim 65, which was objected to, has been rewritten in independent form including all the limitations of the base claim and any intervening claims and is therefore allowable. The examiner had indicated the allowability of this claim if it were so rewritten.

Claim 66 and 67 are not anticipated by or obvious in view of Bursi et al. for at least the same reasons as claim 1, from which they depend.

Claim 68 is not anticipated by or obvious in view of Bursi et al. for at least the same reasons as claim 18, from which it depends.

Claim 69 is not anticipated by Bursi et al. because Bursi et al. does not teach scaling. Although the Office action alleges that "data conversion" as taught by Bursi et al. may be

equated with scaling, that contention is contradicted by the Bursi et al. reference itself. Bursi et al. specifically teaches (at page 862) that “[d]ata conversion ... is essentially a change of the sampling interval.” In other words, data conversion as taught by Bursi et al. is related to the way spectral data is segmented. Segmentation relates to the division of spectral data into sub-spectral units (such as the sampling interval), whereas scaling relates to manipulating the intensity of signals that fall within particular sub-spectral units. Thus, Bursi et al. does not anticipate claim 69 for at least the reason that it does not teach scaling. Furthermore, Bursi et al. fails to anticipate amended claim 69 in which weighting the spectral data is said to emphasize bins associated with the biological property of the test compounds. The Office action had noted that Bursi et al. anticipated claim 69 because the language of the claim had been interpreted to cover equally weighted bins, as in Bursi et al. Amended claim 69 overcomes that rejection. Since the cited reference neither discloses nor suggests the claimed weighting, claim 69 is allowable. The rejection of claim 1 under 35 U.S.C. §102 should be withdrawn and claim 1 should be allowed. Applicants respectfully request such action.

Furthermore, claim 69 is not obvious in view of Bursi et al. because Bursi et al. does not teach, suggest or provide a motivation for using scaling and/or the claimed weighting in combination with spectral data and/or the other features of claim 69.

Claims 70-74 were objected to. Claims 70 and 72-74 have been rewritten in independent form including all the limitations of the base claim and any intervening claims. These claims are therefore allowable. Applicants thank the examiner for indicating the allowability of these claims.

Claims 75-80 are not anticipated by or obvious in view of Bursi et al. for at least the same reasons as claim 69, from which they directly or indirectly depend. The rejections of dependent claims 75-80 under 35 U.S.C. §102 should be withdrawn, and these claims are allowable.

Claim 90 is not anticipated by or obvious in view of Bursi et al. for at least the same reasons as independent claim 82, from which it depends. Claim 90 was not rejected by the Office action under 35 U.S.C. §102 as allegedly being anticipated by Bursi et al. Therefore, the rejection of claim 90 should be withdrawn, and claim 90 should be allowed. Applicants respectfully request such action.

New claims 103-115 also are allowable in view of Bursi et al for at least the reason that Bursi et al. does not teach or suggest scaling, or weighting of data to emphasize bins associated

with the biological activity. Furthermore, claims 105-115 recite additional features and/or combinations of features not taught or suggested by Bursi et al.

7. *Conclusion*

Applicants request reconsideration of the rejections, and submit that all pending claims are in condition for allowance. If any issues remain before a Notice of Allowance is issued, the Examiner is invited to telephone the undersigned patent attorney at the telephone number provided below.

Respectfully submitted,

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